Nutritional Intake Patterns of Patients with Chronic Venous Leg Ulcers

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Background

• Chronic venous leg ulcers (CVLUs) affect ~1% of the worldwide population and ~3.6% of individuals over age 65. [1]

• 50%-65% of CVLUs require at least 6 months to heal; 20% are not healed after 2 years; ~8% never heal. [2]

Global Dermatology- Chronic Venous Ulcers

• Pathobiology of CVLUs involves sustained venous hypertension, edema & **chronic inflammation**. [2]

• Low intake levels of certain nutrients such as **vitamin C, zinc, protein, & amino acids** have been linked to slow healing of pressure ulcers, but no studies have assessed levels in CVLU patients. [3,4,5,6]

• An imbalance in inflammatory mediators generated from **n-6 and n-3 polyunsaturated fatty acids (PUFAs)** has been linked to **chronic inflammatory diseases** such as asthma, but no studies have assessed their role in CVLUs. [6]

• Evidence supports use of n-3 supplements to balance high n-6 to n-3 ratios.

Research Questions

In a sample of CVLU patients:

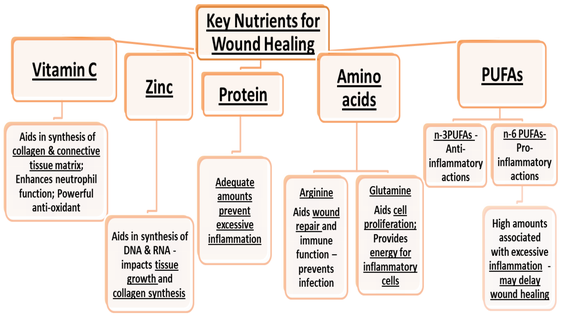
1) How do daily intake levels of vitamin C, zinc, protein, & amino acids (glutamine, arginine) compare to recommended daily intake (RDI) levels?

2) What are daily intake levels of n-6 PUFAs relative to n-3 PUFAs?

3) What are opinions about making dietary changes and/or consuming dietary supplements to improve wound healing and overall health?

Theoretical Framework

• Key nutrients associated with wound healing and their specific actions.



Methods/Measurements:

• **Study design**: Descriptive, cross-sectional study using secondary analysis of data.

• **Primary study aim**: Profile lipid mediators of inflammation in CVLU microenvironments.

• **Setting:** Clinical research center at large Midwest University

• **Sample**: 12 adults from Midwest with CVLUs, ages 48-80 years.

•**Measures:**

- Sociodemographic data & opinions about dietary supplement use collected via questionnaire (self-report; paper/pencil).
- Anthropometric data collected via Harpendon Stadiometer and ProPlus Scale (Body Mass Index – BMI).
- Nutritional data collected via electronic Food Frequency Questionnaire (FFQ).
- Plasma PUFA samples analyzed via gas chromatography.

•**Data analysis**: Descriptive statistics, including percent, range, mean, and standard deviation (SD), were used to characterize sociodemographic, nutritional, plasma PUFA and body composition data.

Results

• **Characteristics of Participants (N=12)**

	Number in sample (SD)
Age, mean years	64.25 (9.49)
Age, range	48-80
Gender:	
Male	10
Female	2
Race:	
Caucasian	8
African American	3
Other	1 (Creole)
Education:	
High school graduate	7
Some college	3
College/University graduate	2
Annual household income:	
< $10.000	4
$10,000 - $14,999	1
$15,000 - $29,999	3
$30,000 - $44,999	1
$45,000 or more	3
BMI, kilograms/meter^2, mean	41.48 (11.47)
PSS score, mean	16.42 (9.80)
Consider making dietary changes/taking supplements	100%

BMI= Body Mass Index
PSS= perceived stress scale (0-40) with higher score= higher perceived stress

• **Food Frequency Questionnaire Data (N=12)**

Nutrient	Mean (SD)	RDI
Vitamin C, mg/day	60.03 (49.73)	75-90
Zinc, mg/day	10.78 (5.17)	8-11
Protein, g/day	71.37 (31.32)	46-56
Amino Acid, g/day		
Glutamic Acid	13.79 (5.89)	0.8g/kg body weight/day*
Arginine	3.74 (1.75)	0.4-1g/day divided in equal doses**
PUFA, g/day		
EPA	0.027 (0.021)	N/A
DHA	0.064 (0.047)	N/A
EPA+DHA	0.046 (0.034)	0.4 – 0.5 EPA+DHA***
AA	0.17 (0.16)	N/A

Recommended Daily Intake (RDI)
Tolerable Upper Limit **
No individual RDI ***
DHA= docosahexaenoic acid
EPA= eicosapentaenoic acid
AA= arachidonic acid

• **Plasma PUFA Data (N=12)**

PUFAs % of total	Plasma, Mean (SD)	Normal Range	Wound Fluid, Mean (SD)	Correlation Pearson's r
AA	8.64 (2.73)		2.35 (.76)	r=0.40 p=0.33
EPA	0.43 (0.14)		0.33 (0.13)	r=0.39 p=0.33
DHA	2.14 (0.66)		2.59 (0.59)	r=0.83 p=0.01*
n-6:n-3	11.25 (1.99)	1-4 (Optimal)	9.45 (2.35)	r=0.84 p=0.01*
AA:EPA	21.70 (7.87)		26.97 (5.39)	r=0.84 p=0.36

AA= arachidonic acid
EPA= eicosapentaenoic acid
DHA= docosahexaenoic acid

Discussion

- We report that **vitamin C** intake was **below RDI levels** in this sample of CVLU patients, which could be contributing to healing delays.
- While participants were consuming adequate amounts of other key nutrients linked to efficient wound healing, increased cellular activity at chronic wound sites may result in the body's need for higher than RDI intake levels of these nutrients to facilitate healing.
- **High average n-6 to n-3 ratio** indicates high levels of inflammation, which could be contributing to healing delays.
- **High average BMI**, indicating morbid obesity, and **mid level PSS scores** provide new knowledge about overall health status of this sample of CVLU patients. Obesity & stress have been linked to delays in wound healing.
- **All participants reported they would make dietary changes and/or take supplements** if results included improved wound healing.
- Low income may be a barrier to making positive nutritional changes in this population.

Implications for Nursing

- Nurses are important members of the healthcare team who could advocate for multidisciplinary approach to CVLU care - to promote healthy, nutrient-rich diets and ways to achieve healthy weights and reduce stress to improve wound healing & long term health outcomes.

Future Research

- Future studies could consider larger samples of CVLU patients in other regions of U.S., assessing role of geographic location, ethnicity, socioeconomic factors, education, stress, and barriers to success.

References

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